IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

ANIBAL RODRIGUEZ, SAL CATALDO, JULIAN SANTIAGO, and SUSAN LYNN HARVEY, individually and on behalf of all other similarly situated,	§	
Plaintiffs,	§	**Case No. 3:20-cv-04688-RS**
v.	§	
GOOGLE LLC,	§	
Defendant.	§	

EXPERT REPORT OF JONATHAN E. HOCHMAN

March 22, 2023

Appendix E

Ad Campaigns and Conversion Tracking/Modeling

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1 Types of Ad Campaigns

1. Non-Google apps use Google's advertising platforms called Google Ads (formerly known as Google AdWords[1]) and/or Display & Video 360 (formerly known as DoubleClick Bid Manager[2]) to manage their advertising campaigns. A non-Google app developer can specify a few different types of ad campaigns, including but not limited to App, Search, Display, and Video.[3]

1.1 App Campaigns (App Promo)

2. An App Campaign (also called "app promotion" or "app promo" campaign) has three options that advertisers can select from[4]:

[1] "Google Ads Rebrand for AdWords, as of August 2018" (GOOG-RDGZ-00193001 at -004).
[2] "We've unified our DoubleClick advertiser products and the Google Analytics 360 Suite under a single brand: Google Marketing Platform. As part of the launch of Google Marketing Platform on July 24, 2018, the following changes occurred to DoubleClick Digital Marketing products: DoubleClick Bid Manager is now Display & Video 360, a product that brings together planning, creative, buying, and measurement features into a single tool." *Introducing Google Marketing Platform*, Campaign Manager 360 Help, https://support.google.com/campaignmanager/answer/9015629?hl=en (Last accessed March 15, 2023).
[3] *Choose the Right Campaign Type*, Google Ads Help, https://support.google.com/google-ads/answer/2567043 (Last accessed March 15, 2023).
[4] *About App Campaigns*, Google Ads Help, https://support.google.com/google-ads/answer/6247380 (Last accessed March 15, 2023).

- App Installs – run ads that encourage users to install an app. A user clicking on the ad is taken to an app store to install the app. Such ad campaigns are called App Campaigns for Installs (ACi) (GOOG-RDGZ-00056514 at -517).

- App Engagement – show ads to users who have already installed an app. App engagement ads encourage users to come back to a specific part of the app to make a purchase, book a flight, etc. Such ad campaigns are called App Campaigns for Engagement (ACe) (GOOG-RDGZ-00056514 at -517). App developers configure what are called "deep links," which "send mobile device users directly to relevant pages in [an] app rather than [a] website."[5]

- App Pre-registration (Android only) – run ads for apps before they are released on Google Play. These ads generate user's interest in an app that has not been released. "Before an [] app is released on the Google Play Store, users have the option to pre-register for [the] app or game. On the first day of launch, users receive a notification to install the app" (GOOG-RDGZ-00194335 at -395). App pre-registration was beta tested in 2019 and launched in 2020 (GOOG-RDGZ-00067938 at -940).

3. App Campaign ads can "appear across Google's properties. This includes Google Search, Google Play, YouTube, the Google Display Network, AdMob, Discover on Google Search, [Google's] search partners, and many more publishers who host app ads."[6] Within apps, App Campaign ads can be served by the Google Mobile Ads SDK (which supports AdMob and Ad Manager).

4. App Campaigns were previously called Universal App Campaigns (UAC). Google renamed UAC to App Campaigns in February 2019.[7] UAC itself was launched in 2015. At that time, UAC campaigns "allow[ed] an AW [AdWords] app advertiser to run one simple campaign across 5 channels: Google Play, Search (Google.com), AdMob, mGDN [mobile Google Display Network] & YouTube" (GOOG-RDGZ-00081274 at -275). UAC Campaigns and its successor, App Campaigns, "use[] machine learning to make the smartest decision for each ad, analyzing

[5] *About Deep Links*, Google Ads Help, https://support.google.com/google-ads/answer/10023042 (Last accessed March 15, 2023). ACe falls back to the app store if the app is not actually installed, although Google clarifies that "[t]his is an edge case, since we try to avoid serving ACe campaigns to users who don't have the app installed" (GOOG-RDGZ-00056514 at -517).
[6] *About App Campaigns*, Google Ads Help, https://support.google.com/google-ads/answer/6247380 (Last accessed March 15, 2023).
[7] *Universal App Campaigns Are Now Simply App Campaigns*, Google Ads Help, https://support.google.com/google-ads/answer/9256714 (Last accessed March 15, 2023).

hundreds of millions of potential signal combinations in real time" to serve app ads across "Google Play, Google.com, YouTube and the millions of sites and apps in the Display Network" GOOG-RDGZ-00081274 at -275.[8] As Google explained to app developers, "Universal App Campaigns is combining rich data about user actions, intent and context with smart machine learning to show your ads to the right person in the moments that matter…Machine Learning is UAC's underlying source of success combined with data and Google's distribution channels" (GOOG-RDGZ-00195309 at -508). With UAC, Google dynamically generates ads as well as bid price to reach app developers' cost-per-install (CPI) targets (also called target cost-per-install tCPI).[9]

5. While UAC initially focused on app installs to encourage new users to try an app (App Campaigns for Installs (ACi) or formerly just as UAC (GOOG-RDGZ-00182145 at -145)), Google later added App Campaigns for Engagement (ACe) (also referred to as UACe) (GOOG-RDGZ-00193001 at -006) to encourage existing app users to come back to an app that is already installed. Google fully launched ACe towards the end of 2020 after beta testing. Google required app developers to implement app conversion[10] tracking and deep linking, and to have a minimum of 250,000 app installs.[11] To run ACe campaigns, "Advertisers upload a pre-defined audience (user-lists of device IDs), set a tCPA [target Cost per Action] for a specific action (e.g. app open, or virtual good purchase) and upload a set of creative assets. ACe then optimizes across all inventory channels to delivery maximum conversions at the target CPA…ACe's bidding is 100% driven by

[8] Sissie Hsiao, *Propel Your Mobile App Growth With Universal App Campaigns*, Google Ads, https://www.blog.google/products/ads/propel-your-mobile-app-growth-wi/ (Last accessed March 15, 2023).
[9] Ginny Marvin, *Google's New Universal App Campaigns Push App Promotions Across Search, YouTube, AdMob, Display*, Search Engine Land, https://searchengineland.com/google-adwords-universal-app-campaigns-push-ads-221813 (Last accessed March 15, 2023). GOOG-RDGZ-00195309 at -534 discusses auto-generated video ads. GOOG-RDGZ-00196620 at -627 discusses auto-generated image ads.
[10] A conversion event is an advertiser defined metric that is important to their business. For example, app install and purchase within an app can be conversion events. Google keeps tracks of these conversion events and later makes the connection between a conversion event and a prior ad view or ad click in a process called "attribution."
[11] *App Campaigns For Engagement Now Available For Eligible Advertisers Globally*, Google Ads Help, https://support.google.com/google-ads/answer/10287275 (Last accessed March 15, 2023).

Machine Learning…ACe will look across Search, AdMob, YouTube, and Play for users relevant to the inputted business goals" (GOOG-RDGZ-00204430 at -434 and -435).

6. Google tracks "app installs and in-app events in Google Ads" using GA4F (GOOG-RDGZ-00201148 at -160). Google explained to app developers in 2016 that "UAC will work seamlessly with Firebase Analytics … and continue to integrate with the top 3rd party app SDK's. We're especially excited about Firebase as it provides prebuilt engagement and in-app actions that will help you manage your conversions. And when you funnel these conversions into Adwords - UAC will automatically optimize to them. So, for app developers who want to find those users most likely to take meaningful actions, like reach level ten of their game, purchase that new camera, or book a vacation we've made it easier than ever" (GOOG-RDGZ-00195309 at -493).

1.2 Other Types of Ad Campaigns

7. Aside from App Campaigns, Google Ads and Display & Video 360 (DV360) also support other types of ad campaigns, including Search, Display, and Video.[12] Search campaigns run ads on search results pages across Google.com and Google's search network[13] to show ads to people searching for a particular product or service. Display campaigns run ads across websites and apps as users browse websites and mobile apps.[14] Video campaigns run videos ads across YouTube and other websites and apps running on Google video partners.[15]

[12] *Choose the Right Campaign Type*, Google Ads Help, https://support.google.com/google-ads/answer/2567043 (Last accessed March 15, 2023).
[13] Google explains that "[t]he Google Search Network is a group of search-related websites and apps where your ads can appear. When you advertise on the Google Search Network, your ad can show near search results when someone searches with terms related to one of your keywords." *About the Google Search Network*, Google Ads Help, https://support.google.com/google-ads/answer/1722047 (Last accessed March 15, 2023).
[14] Google explains that "Display campaigns serve visually engaging ads on the Google Display Network. The Display Network helps you reach people as they browse millions of websites, apps, and Google-owned properties (such as YouTube and Gmail)." *About Display Ads and the Google Display*, Google Ads Help, https://support.google.com/google-ads/answer/2404190 (Last accessed March 15, 2023).
[15] *About Video Campaigns*, Google Ads Help, https://support.google.com/google-ads/answer/6340491 (Last accessed March 15, 2023).

8. Users interacting with Search, Display, and Video ads can later perform a conversion action either on an advertiser's app or website. Appify (externally called "App Deep Linking" (GOOG-RDGZ-00198933 at -938)) is a Google technology layer that enables ads shown under these types of ad campaigns to "deep-link into apps using URLs. This is a strategically important way to drive app conversions and therefore part of the app attribution story. App conversion tracking is complex since conversions can occur either on an app's mobile website (no deep link) or in the app itself (Appify deep link). Appify works when an advertiser sets up app links (Android, iOS). When app links are set up, mobile users who click on an ad with a URL landing page are not promoted to choose how to open the link but are instead taken directly to the advertiser's app. Mobile users who don't have the advertiser's app installed and users on Desktop are directed to the advertiser's website" (GOOG-RDGZ-00056514 at -518). Appify was launched by June 2019, with open beta launched earlier (GOOG-RDGZ-00198033 at -034 and -036).[16] Google later referred to Appify as Web to App Connect (W2AC) (GOOG-RDGZ-00202401 at -408).[17]

9. While both ACe and Appify may lead a user to apps, Appify is different from ACe. As Google explains, "ACe is a dedicated App Campaign type which re-engages app users by targeting audience lists of existing app users" whereas "Appify applies to existing Search, Display and Shopping (web) campaigns, and directs users to the app if the user already has the app…For ACe,

[16] *See also* GOOG-RDGZ-00202401 at -424 ("Last year at Google Marketing Live, we announced app deep linking from Search, Display and Shopping ads. In the coming months, we'll be rolling out deep linking from YouTube, Hotel, Gmail and Discovery ads. On average, deep linked ad experiences drive 2X the conversion rates.); Prabhakar Raghavan, *Google Marketing Live: Building for the New Consumer Journey*, Google Ads & Commerce Blog, https://blog.google/products/ads/new-ad-innovations-new-consumer-journey/ (Last accessed March 17, 2023) ("over the next few weeks, we'll enable app deep linking from Google Ads and offer more robust reporting across web and apps. Your app users will be taken directly from your Search, Display and Shopping ads directly to the relevant page in your mobile app, if they have your app already installed."); Allison Schiff, *Google Is Doubling Down On Deep Linking*, AdExchanger, https://www.adexchanger.com/mobile/google-is-doubling-down-on-deep-linking/ (Last accessed March 17, 2023) ("Google bolstered its deep linking offering on Wednesday by enabling from YouTube ads, Hotel ads, Gmail ads and ads in Discovery, which is the main section of the Google app. Previously, it had only been available in search, display and Shopping ads.").

[17] Firebase Dynamic Links is not supported by Web to App Connect. "Web to App Connect (fka Appify)…only support App Links (Android) and Universal Links (iOS)" (GOOG-RDGZ-00201684 at -745).

all traffic is directed into apps, whereas for campaigns with Appify, a large portion of the traffic will continue to be sent to websites" (GOOG-RDGZ-00202401 at -516).

10. By 2019, "the Google Analytics for Firebase (GA4F) SDK … [was made] mandatory for the next generation of UAC/UACe/Appify features" (GOOG-RDGZ-00054819 at -821).

2 Conversion Tracking/Modeling and Attribution Overview

11. Google demonstrates the effectiveness of its advertising platforms to advertisers through the ability to track conversion events as well as the ability to attribute that conversion event to a prior ad interaction event. The data collected allows Google to develop machine learning algorithms to determine the optimal bid price and to model conversions when conversion tracking is unavailable. These are discussed in more detail in this section.

2.1 Conversion and Attribution

12. There are three types of conversions: Click-through-conversions (based on ad click), Video engagements (when a user watches a video for more than 10 seconds), and View-through-conversions (based on a viewable ad impression) (GOOG-RDGZ-00056514 at -518).

13. Within non-Google mobile apps, Google tracks conversion events through Firebase, which is designed to track individual events. This is contrasted with older Google Analytics products that track conversions based on browsing sessions. As explained by Google, "[h]istorically, Google Analytics for websites had a sessions-based data model where conversions were defined as 'did this session convert' rather than 'did a conversion happen', whereas AWCT [AdWords Conversion Tracking] and Floodlight had a much simpler 'event-based' data model that directly spoke to 'did a conversion happen'. This was addressed head on with Google Analytics for Firebase (GA4F), which moved to an event-based data model for app analytics and conversion tracking so that it also answered 'did a conversion happen'. This was a major contributing factor to AWCT for apps

being deprecated and replaced by GA4F. Google Analytics '[redacted]' is the expansion of GA4F such that it will replace all of Google Analytics classic. The result is that all Analytics for web, app, and hybrids will leverage the event-based model going forward" (GOOG-RDGZ-00054819 at -821).

14. "Since 2016, Google Analytics for Firebase users [in this context, app developers] have been able to link their Firebase app with their corresponding Play app to allow Play data (e.g. IAP [in-app-purchase] events) to flow into their Firebase project. This integration has enabled users to track IAP conversions for AdWords and DoubleClick, add another metric for segmenting audiences and LTV, and much more" (GOOG-RDGZ-00194335 at -423).

15. Conversion events may also be tracked by Google's App Attribution Partners (AAPs).[18] "Developers tracking conversions using AAP SDKs wouldn't go through Google Analytics but can still notify Google Ads when conversions happen. Google ads reporting currently supports conversion imports from FiB [Bidding on Firebase[19], Google Play, and a variety of AAPs…However, advertisers will need to use the Firebase SDK if they want to employ automated bidding in Google Ads" (GOOG-RDGZ-00056514 at -517).

16. To complete ad performance measurement, an attribution process is implemented to determine which prior user ad interaction led to a conversion event.[20] "App attribution is a bit different from web attribution. In place of cookies or image pixel tags are SDK identifiers, advertising IDs, referrers [Android only], click data, and other information. Since users engage with apps over a period of time, there's also added emphasis on lifetime value when it comes to app attribution" (GOOG-RDGZ-00056514 at -514).

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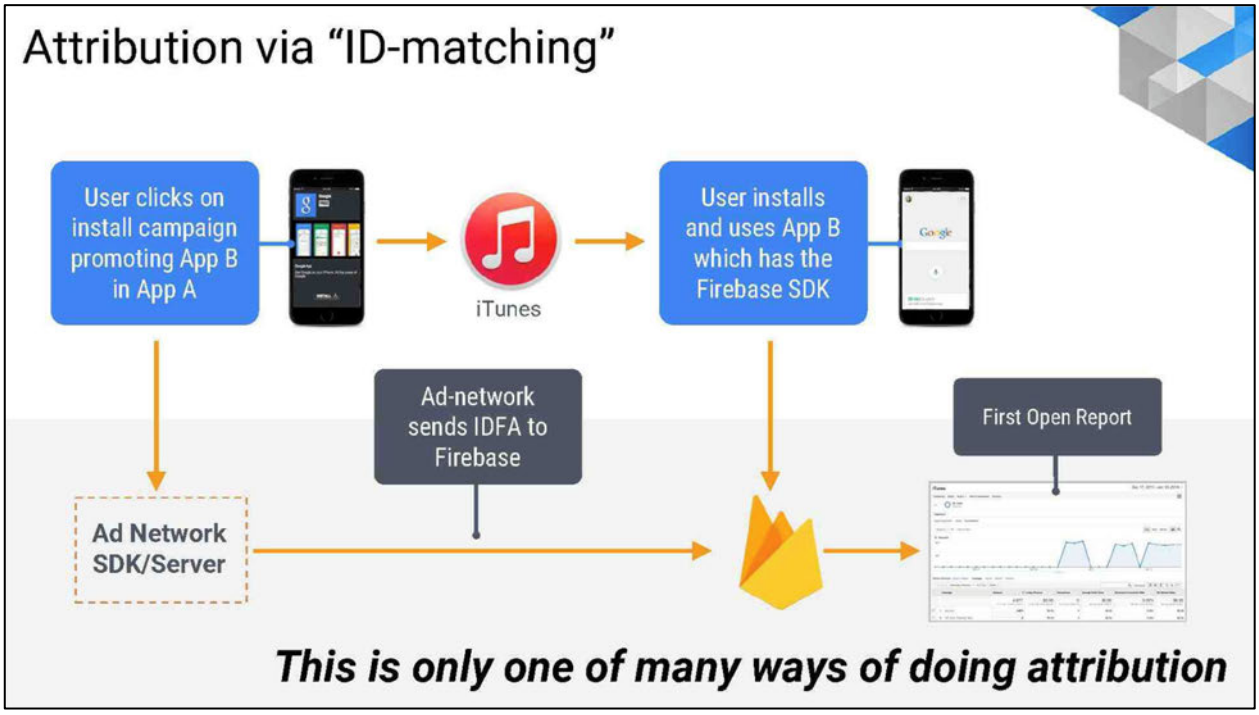
[18] "The App Attribution Partner (AAP) Program is a formal partnership program between 3rd party app tracking providers and Google to measure the performance of app campaigns in AdWords" (GOOG-RDGZ-00193001 at -004).

[19] GOOG-RDGZ-00198985 titled "Appify – Bidding on Firebase Conversions – PRD" and go/fib-conversions-bidding-prd.

[20] Google applies machine learning to determine attribution with what is called Data-driven attribution (DDA) (GOOG-RDGZ-00056514 at -518).

17. One way for doing attribution is shown in GOOG-RDGZ-00061704 at -723, reproduced in the figure below. This particular attribution flow relies on device IDs (in this case, IDFA) to match an ad click to a conversion event tracked by GA4F. As noted in the figure below, this is only one of many ways Google performs attribution.



18. When devices IDs are not available, conversion tracking/attribution may be enabled using GCLID (Google Click ID). "Firebase sdk can extract the gclid using two ways – Deeplink click url for Appify/ACe" and "Play Referrer API for ACi" (GOOG-RDGZ-00177322 at -322).

19. When both device ID and GCLID are not available (for example, with Apple's App Tracking Transparency in iOS14), Google implemented an aggregated ID called GBRAID ID (Google Broad Ad ID (GOOG-RDGZ-00178406 at -407)), which is passed from deeplink URLs to Gold and Ads for Appify (GOOG-RDGZ-00054816 at -818; GOOG-RDGZ-00187249 at -264). Google explains that "[i]nstead of using gclid which is used to tie back the conversion to a click (and thus a user), Ads will be using an aggregated ID (CampaignID / AdgroupID) which generally

maps to multiple users. As a result, we do not know which user has converted but we would still be able to measure the number of conversions that occurred at the aggregate level. SDK stores GBRAID as user property and sends it for each conversion. Besides sending GBRAID to App Ads along with conversions in the BOW ping, Attribution unpacks GBRAID and matches it to random clicks with the same cohort. Thresholding will be applied to make sure a conversion is dropped if the number of clicks from the GBRAID on that date is too few" (GOOG-RDGZ-00177752 at -755 to -756).

2.2 Bidding

20. When an ad slot becomes available as a user browses a website or an app, multiple advertisers will compete to have their ad shown to the user. The advertiser's ad that gets shown is determined through a bidding process where advertisers submit their interest for the ad slot as well as a bid price. There are several different bidding strategies depending on the type of ad campaign and the advertiser's goal, including maximizing the number of clicks, impressions, conversions or views.[21] For example, if an advertiser wants to maximize the number of app installs or in-app events, they may choose to maximize conversions using Google's Smart Bidding, available since mid-2016.[22] Advertisers have the choice to optimize several metrics, including target cost-per-install (tCPI) or target cost-per-action (tCPA).[23] In addition, Google launched Target Return on Ad Spend (tROAS) (equal to a user's lifetime value (LTV), which measures the value of the user

[21] *Understanding Bidding Basics*, Google Ads Help, https://support.google.com/google-ads/answer/2459326 (Last accessed March 15, 2023).
[22] Anthony Chavez, *Get More Powerful Bids Automation With New AdWords Smart Bidding*, Google Ads & Commerce Blog, https://www.blog.google/products/ads/more-powerful-bid-automation-with-smart-bidding/ (Last accessed March 15, 2023).
[23] "Smart Bidding refers to bid strategies that use machine learning to optimize for conversions or conversion value in each and every auction—a feature known as 'auction-time bidding'. Target CPA, Target ROAS, Maximize conversions, and Maximize conversion value are all Smart Bidding strategies." *About Smart Bidding*, Google Ads Help, https://support.google.com/google-ads/answer/7065882?hl=en (Last accessed March 15, 2023).

to an app / Cost) (GOOG-RDGZ-00066625 at -633) in 2019.[24] Google explains to app developers that "Google Ads Smart Bidding and Smart Creative solutions use machine learning that analyzes millions of signals in real time to show the right message to the right customer in the moments that matter. So instead of having to spend time manually optimizing your ads or bidding, you can get better results faster with the help of automated solutions."[25] Google further explains to app developers, "Smart Bidding is a set of automated bidding strategies that use machine learning to optimize for conversions or conversion value. Smart Bidding sets precise bids for each and every auction to help drive higher conversion volume or conversion value at a cost efficiency that is comparable to or better than existing performance goals."[26] Advertisers can also set bid price manually.[27] However, [redacted]" (GOOG-RDGZ-00195309 at -516).

21. Appify, for example, leverages Smart Bidding for significant revenue gains for advertisers and Google. As Google explained, [redacted] Today, Smart Bidding for Appify (also known as conversion optimizer) is available on Search. This means that: when we detect that the app is installed on the user's device, we will bid higher on that Search ad for a higher chance of mCVR [Mobile

[24] An internal Google document states [redacted] (GOOG-RDGZ-00207461 at -465). A May 2019 Google blog article stated "tROAS will be available next month for Google App campaigns on iOS and Android globally." Sissie Hsiao, *Smart Strategies For Growing Your App Business with Ads*, Google Ads & Commerce Blog, https://blog.google/products/ads/google-io-ads-announcements/ (Last accessed March 15, 2023).

[25] *About Smart Bidding and Smart Creative Solutions with Google Ads*, Google Ads Help, https://support.google.com/google-ads/answer/9297584?hl=en (Last accessed March 15, 2023).

[26] *Your Guide to Smart Bidding*, Google Ads Help, https://support.google.com/google-ads/answer/11095984 (Last accessed March 15, 2023).

[27] *About Bidding in App Campaigns*, Google Ads Help, https://support.google.com/google-ads/answer/7100895 (Last accessed March 15, 2023).

Conversion Rate]. This is going to launch on PLA [Product Listing Ads] in Q3'20 . . ." (GOOG-RDGZ-00202401 at -448).

22. Conversion tracking and attribution are key to bid optimization in order to maximize the likelihood of an ad leading to conversion. As Google explains, "Advertisers utilize app tracking SDKs to track app conversion events, and use these for bidding" (GOOG-RDGZ-00198985 at -985). "Accurate conversion data is critical for bidding performance — both for customers using Google auto-bidding, and those bidding manually. If conversion data becomes less granular and accurate, reduced bidding performance may lead to decreased advertiser investment in Google" (GOOG-RDDGZ-00148902 at -922).

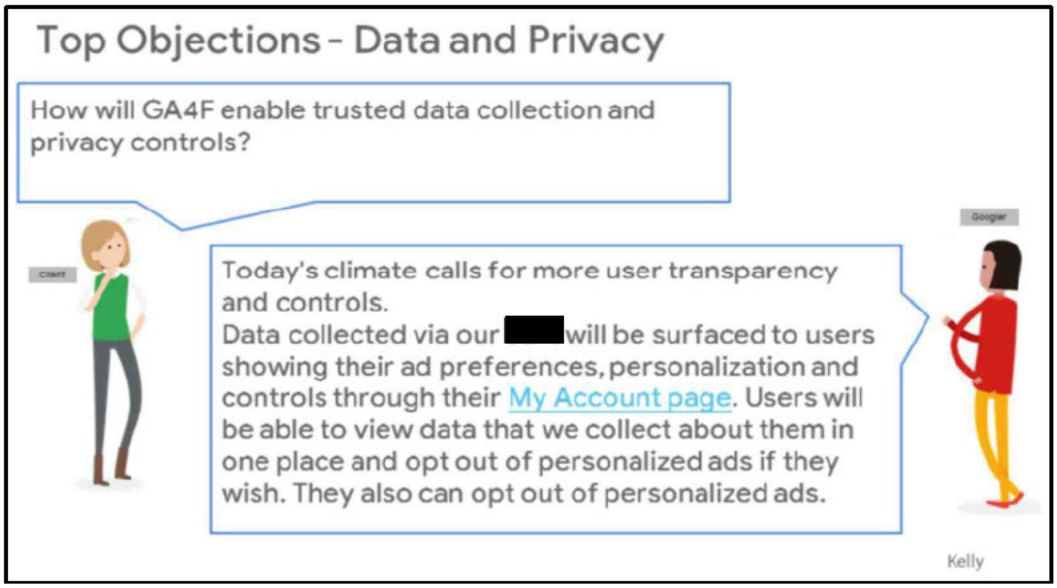
23. Conversion tracking can be set up in Google Ads with conversion data imported from measurement [redacted] such as GA4F or AAPs. Once the advertiser organizes conversion events by measurement [redacted] such as GA4F into goals (e.g., Purchase), performance of future ad bids will be measured against conversion events tracked by GA4F. As Google explains, "[b]id on Firebase conversions … including GA4F app events in 'account-level goals', previously known as 'include in Conversions'. This allows to boost performance of deep linked campaigns: more than 2X conversions" (GOOG-RDGZ-00202401 at -455).

24. When GA4F was released, relatively few developers bid against conversions tracked by GA4F. In response to the relatively small percentage of advertisers bidding on GA4F conversions, Google implemented a project internally called Project Uno to "Drive adoption of Google Analytics for Firebase (GA4F[redacted])" (GOOG-RDGZ-00200228 at -242; *see also* GOOG-RDGZ-00177709 at-710). As stated in an internal Google document, the goal of [redacted] was to grow "mobile revenue with 100% of biddable[28] in-app and install conversions on Firebase only (GOOG-

[28] Google explains that "biddable = included in the 'conversions' column" for Google Ads reporting (GOOG-RDGZ-00202401 at -448).

RDGZ-00111850 at -851) and "[redacted] drives migration from AAP to 1P ([redacted] This allows bidding optimization to rely on 1p path" GOOG-RDGZ-00196620 at -672). Google explained that "[e]specially because of the 1P[redacted] Strategy ([redacted], Google Analytics plays a more strategic and impactful role in our growing Apps business (~$10B ARR) than ever before. Unlike on web, our SDK and product are on the critical path to our App advertiser products, including Appify, and we have a big opportunity to drive incremental value because of our advertiser footprint" (GOOG-RDGZ-00059723 at -728). Rahul Oak, the former App Ads "lead" on Project Uno, described Project Uno as an effort "to build features to make [Google's] advertising products more efficient and more useful for advertisers," including through building "machine-learning models" (Oak Tr. 109:23-110:1, 110:6-10).

25. Google enticed advertisers to adopt GA4F in their apps by advertising that GA4F adoption would (1) create a 10-20% estimated performance gain for advertisers and (2) enable new features available only with GA4F, such as optimizing [redacted] in advertising (GOOG-RDGZ-00202698 at -700). Ironically, one of the benefits Google pitched to advertisers to switch from AAPs to GA4F was user transparency and control, shown in the figure below (GOOG-RDGZ-00197718 at -739). Google claimed that users can view their data in their My Account page, but as I discuss in my report, this only applies when users are signed-in and have turned WAA-on and sWAA-on. Contrary to what Google told developers, Google does not "surface[] to users" the data that Google "collect[s] via [its] [redacted]" if the user has turned off WAA or sWAA; users have no "transparency and control[]" over Google's collection of this data.



26. Google's [redacted] has been quite successful since its launch in early 2019. Google's Supplemental Response to Interrogatory No. 17 states: "Google tracks app campaign ad spend that is bid against different types of conversions. As of last month [October 2022], approximately 55% of app campaign ad revenue was attributable to conversion types bid against GA4F (as opposed to other sources of conversions). Before [redacted] which launched in approximately 1H 2019, this percentage was significantly lower–approximately 6% or less. By October 31, 2019, this percentage was 10.6%. By October 21, 2020, it was 29.4%. By October 1, 2021, it was 49.4%. By October 1, 2022, it was 54.9%."

2.3 Conversion Modeling

27. When precise conversion tracking or attribution is not possible, Google uses machine learning algorithms to perform conversion modeling. As Google explains, "Google has used conversion modeling in conversion reporting for years … modeling has always been necessary in environments where we cannot fully link ad interactions to conversions. More recently, we have modeled conversions for apps, when the ad originates on iOS … When Google surfaces modeled conversions in Google Ads, we are predicting attributed conversions. In most cases, Google will

receive ad interactions and conversions but is missing the linkage between the two. The modeling we perform is modeling whether a Google ad interaction led to the conversion, we are not modeling whether a conversion happened or not" (GOOG-RDGZ-00142709 at -709). Google further explains that "[i]n order to model for the non observed slice, we try our best to use data from high fidelity observable slices where we know behaviour is the same or very similar to the unobserved slice … We leverage ground-truth from historical conversion rates, device type, time of day, geo, operating system, and more, to predict the likelihood of a conversion event across the set of users who viewed or clicked on an ad" (GOOG-RDGZ-00142709 at -711).

28. For app ads, Google explains that "[t]oday, the Google Ads Front End (GAFE) does not distinguish between modeled conversions and non-modeled (i.e. deterministically measured) conversions. On App Ads, we create modeled conversions for [redacted] (modeling x-device conversions) and [redacted](modeling mobile web search conversions…)" (GOOG-RDGZ-00208133 at -133). In another document, Google explains that [redacted] performs "iOS conversion modeling based on ML [machine learning]. Beta launched in early July 2018" (GOOG-RDGZ-00193001 at -005) and [redacted] is a "Project name for iOS conversion tracking tying Zweiback Cookies from web to IDFA. Launched in Q1 2018 with 25% coverage" (GOOG-RDGZ-00193001 at -006).